STUDY OF OXYFLUORIDE GLASS IN PHOSPHATE SYSTEM (P_2O_5-KF-Al_2O_3) FOR PHOTONIC AND OPTOELECTRONICS APPLICATIONS

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Glass systems with mixed compositions of oxides and fluorides are excellent materials which can be applied in different fields of technology, such as light-emitting diodes (LEDs), solid-state lighting, waveguides and displays [1,2]. This study refers to the synthesis of a glass series belonging to the family of oxyfluoride glasses with a phosphate system, with a composition of (50-x)P_2O_5-50KF-xAl_2O_3(PKAl), with x= 8, 12, 16 and 20 mol% of Al_2O_3, by the melt-quenching method. The introduction of Al^{3+}ions in the structure promotes a stabilizing effect, allowing the synthesis of stable glasses in ambient conditions of air and water, with high optical quality, high thermal and mechanical resistance. The synthesized materials showed amorphous characteristic verified by XRD data, the glasses in all Al_2O_3concentrations showed high transparency in the UV-visible region from 340 nm. The DSC results showed that PKAl glasses have low Tg values ranging from 388-454 nm with Al_2O_3concentration. In the FTIR spectra, it was verified that the profiles of the PKAl samples have a similar profile, consistent with the glasses based on phosphate systems, but with alterations corresponding to the structural changes caused by the changes in the proportions of P_2O_5- Al_2O_3, probably due to the changes in the structural units of phosphate groups. The density values of PKAl glasses increased with concentration of $Al_2O_3$from 2.35 to 2.50 g/cm³, this is due to the density of $Al_2O_3$is 1.65 greater than the density of P_2O_5. These results show that the PKAl system is a good candidate for optical and photonic applications, with wide application possibilities.

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References:

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